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## **Generating Ideas for New Mobile TV Services**

*Accepting and Socializing Mobile Television*

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# Generating Ideas for New Mobile TV Services – Accepting and Socializing Mobile Television

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## ABSTRACT

Mobile TV is still in its infancy in respect to identifying new services/content, which deploy the technology convergence of broadcasting, Internet and radio while satisfying the user with respect to interactivity, sociability and content, and at the same time fit the small screen of a mobile phone. This paper reports on a semi-field trial performed with a group of young, IT literate users provided with handheld devices and the possibility of watching mobile TV as a basis for creation of ideas for more advanced services. The results shows that this group of users looks for personalized services and content, which have a high sociability factor.

## Categories and Subject Descriptors

H1.2 [User/Machine systems]: Human Factors

## General Terms

Experimentation, Human Factors

## Keywords

User studies, semi-field trial, mobile TV, user acceptance, social behavior, idea generation, probes, co-experiencing.

## 1. INTRODUCTION

Mobile digital TV is an upcoming service presented for users around the world. So far, broadcast providers have primarily followed the trends and developments serving traditional broadcast TV and perhaps some pay-per-view possibilities.

The CAMMP project (Converged Advanced Mobile Media Platform; <http://www.cammp.aau.dk>) aims at: exploring and developing a platform based on converging technologies such as broadcast, Internet, radio and 3G technologies; and developing prototypes and conceptual content for mobile small screen devices, of interest to users. Much mobile TV is presented to users around the world as traditional TV but on a mobile platform. However, much literature (see for example [11]; [13]) point to the need for understanding whether users want traditional

TV on a mobile platform or the content, lengths of programs, interaction, socializing and sharing possibilities needs to be specially adapted to the smaller screen.

This paper presents results from a semi-field trial with a group of young early IT savvy users focusing on: the concept of convergence inherent in the CAMMP project; as well as identification of new ideas in mobile digital broadcast services that this group would find interesting and would be willing to pay for. The semi-field trial took place in spring 2009 in Ballerup, Denmark.

Outline of the paper is as follows: section 2 presents the basis for the trial in relation to the basic principles and concepts underlying the trial, namely mobile probing and co-experiencing. These concepts relate to the mobile phone as basis for the “probe material” ([4]) exploring the technology, the user needs for socializing, and motivating the generation of ideas. Section 3 describes the set-up of the performed trial and the results. In section 4, a discussion compares the results of the trial with the literature. Finally, section 5 presents the conclusions.

## 2. BACKGROUND

Two central characteristics of mobile phones are 1) the mobility of the user and 2) the support of socializing the user with others. Users consume different content on their mobile phones in respect to geographical position, time of the day, situation and who they are with, [9]. This means that needs for new services may vary throughout the day, across situations etc. Discussing the use of the mobile phone as basis for mobile digital content, several authors have demonstrated that persons use their mobile phones to connect with friends and family and that the mobile phone establishes and nurtures connections among close friends and family ([7]; [8]). Accordingly, new mobile digital services must support communication and socializing. The trial set-up is, therefore, based on two fundamental pillars in the HCI field: mobile probes and the concept of social interaction as co-experience.

### 2.1 Mobile technology probes

One key element in user centric design is to allow for the users to document, reflect and express thoughts in relation to their environment, context and actions. For some years, probing has been used as technique for motivating user reflections in the field where mobility of the user, different contexts and environments and actions defines the needs for technology ([5]; [4]).

A technology probe is defined by Hutchinson et al., [6], as a particular type of probe combining: 1) the social science goal to collect information about the user and the use of technology in a

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real-life (field) setting; 2) to achieve engineering goals of field-testing the technology; and 3) to inspire the users and designers to think of new kinds of technology to support needs and wishes. The technology probe is introduced to the user as a thought provoking technology to be used over a period of time in the users' real context. Hutchinson et al., [6] argue that a technology probe differ from a prototype, for a number of reasons. First of all the focus differ. Prototypes are used for evaluation and correction of "faulty" design, whereas probes are used to find out about how new technology may bring value in different situations. This also hints to a difference between well-known use situations and more unknown ones. Using probes may even include that the probe material (the technology) lack some functionalities in order to provoke users to think out of the box (Ibid.). Probes in relation to prototypes are thus more simple and open-ended tools, and flexible to accommodate for new creative ways of use, meaning users are encouraged to find new ways of using it.

In this trial, the users were provided with a prototype as a technology probe. This was done to match the IT savvy participants. The trial participants were, furthermore, experienced with respect to being creative and producing new ideas on technologies. Therefore, the trial faced a risk that the technology probe was too simple and that the participants would be irritated and less motivated to participate.

The technology probe in this trial was introduced as part of the design process for new mobile services to challenge existing ideas and for influencing future design. The probing approach has proved itself through numerous applications (see for example [5]; [4]; [2]).

## 2.2 Co-experiencing

Emphasizing the focus on services to be presented for users on small, mobile devices, focus must be on how the user perceives the small device. Fundamentally, mobile devices support users' social interactions and needs for communication and sharing of information. If participants in a trial shall be able create new ideas for mobile content, the social aspect of interacting with a mobile device must be supported.

The term co-experiencing refers to the user experience created in social interaction, [1]. The co-experience is seen to be a missing part of many user experience analyses, which focus on the individual side of the experience. However, bringing the social interaction into play, it is expected that new and alternative ideas can be found.

The connection between co-experiencing and being creative and collaborative is stated in Battarbee, [1]. Additionally, Sanders, [10], points out that when people are collectively creative, they accomplish by far more interesting ideas than when people are individually creative. This perspective is also expressed in Taggar, [12], who has found indications that teams may experience expanded sources of knowledge and encouragement of thinking along new lines compared to individual idea thinking.

Expectations are that supporting the co-experience perspective, the trial participants find motivation for being creative in new ways and will be able to suggest interesting new services. Furthermore, the co-creation perspective supports the social emphasis in the technology probe being used in the field trial.

## 3. SEMI-FIELD TRIAL SET-UP

### 3.1 Purpose

The overall purpose of the semi-field trial was to: establish a proof-of concept in relation to the quality of the broadcasting signal and the concept of mobile TV; and to generate ideas for new value adding services. Both purposes were investigated through the semi-field trial including a pre-instruction workshop and a small after workshop.

### 3.2 Outline of the test

The trial took place at Aalborg University Ballerup campus and the surrounding environment. Timely, the trial took place over one week from Monday noon until the following Friday noon, in April, 2009. The trial was repeated twice with two different groups of participants and over two consecutive weeks.

#### 3.2.1 The technology probe

It was decided to use a Nokia N77 phone as basis for the technology probe. This phone supports the DVB-H broadcasting signal, which provided the mobile television and a few selected services. DVB-H is short for Digital Video Broadcasting Handheld and is a global standard for mobile TV and IP Data Cast (<http://www.dvb-h.org>). The CAMMP project experiments with, amongst others, DVB-H technology as broadcasting signaling technology.

A number of simple services were developed and presented acting as motivation understanding the possibilities of future converged services. The services provided included: watching selected channels of traditional television on the phone; user content in terms of creating a video to be uploaded on a channel showing looped playlists (looped videos); and interactive voting for the best video. All these were presented on an Electronic Service Guide to ease the selection of activities. These services were provided in addition to traditional communication services found on a mobile phone such as e.g. short messages.

All participants borrowed a N77 phone (with SIM card) to keep them out of economic constraints in the trial.

#### 3.2.2 Semi-field trial

The coverage of the DVB-H signal from the local antenna on the University campus was around 2 km. This means that the trial participants were able to perform elements of the trial when physically at the University premises, while waiting for the bus outside, then walking/driving to the local train station, or sitting in the train or on the bus for a few km from campus. It was considered sufficient to run the technological probe, with respect to test of services and for and as motivation for thinking creatively about new services/content.

#### 3.2.3 Participants and recruitment

15 participants had signed up for the trial. All participants were students at the medialogy line at Aalborg University Ballerup offers. Of the 15 Students, 2 students were female while 13 were male. Since all participants were selected from the same study line they knew each other and had as such a social network established (with each other) before the trial.

When recruited, all participants were about the trial set-up and about the compensation they would receive (two cinema tickets).

Furthermore, a competition (with the winning price of a box of beer) was announced on the best user produced video. Both test groups got the same information, tasks and compensations.

The participants were between 20-30 years old with an average age of 23.8 years. All students were considered to be IT savvy (which inherently lie in the study line they followed) and were characterized as “early adopters” in respect to new technology.

#### 3.2.4 Tasks for the trial

When the participants arrived at the trial, they received individual questionnaires focusing on understanding their current use of mobile phones and to outline their expectations for the mobile TV and trial. Following, they received: an introduction to the CAMMP project; a specific guide to the activities in the trial; as well as the premises for the trial (for example that they were only able to receive the broadcasting signal when at campus or in the surroundings). Furthermore, each participant was provided with a N77 phone and was instructed about the tasks, they individually should perform in the trial period.

During the week, the participants were asked to perform the following set of tasks:

- Watch television from one of the four available TV channels
- Switch between channels
- Produce a video (with a self-induced theme and idea) to be uploaded on a specified TV channel)
- Vote on the best user produced video
- Note – on paper or via Internet ideas on new services and content.
- Send text messages to a dedicated number about comments, errors, problems, ideas, services, content in general, etc. This feature worked everywhere and was not constrained to the campus and its surroundings.

After the trial, the participants were asked to participate in a workshop where they had the opportunity to give feedback on the trial (how it was, surprising discoveries, etc.) and to present ideas developed over the week on services and content. Before the oral feedback, each participant was again asked to fill out a questionnaire providing information on the individual’s experience with the mobile Television and the ideas created. Additionally, the winner of the video contest was found and the participants returned the N77 phones – and finally received compensations.

Both the pre-meeting as well as the after-meeting was constrained to last one hour to let the students return to their classes as the meetings took place during their lunch break.

### 3.3 Results

The outcome of the trial concentrates on four areas; the general perception of the concept of mobile TV; the DvB-H signal as the broadcasting technology; interactivity perspectives; and ideas for new services and content. The results will be presented in these four sections.

#### 3.3.1 Conceptual acceptance of the CAMMP project

The participants were generally rather positive and interested in the concept of CAMMP and the idea of rich media. Furthermore, the trial showed that the participants

- Would like to watch mobile television
- Would engage in social communities using mobile digital content
  - would like to use the mobile device as a shared device with others
  - participants agreed on the notion of social networks and sharing of content.
- Liked to produce and share content with communities/groups of persons they already know.

#### 3.3.2 Acceptance of the DvB-H signal

Since the quality of the broadcasting signal was a large part of the general acceptance of the concept of mobile television and converged services, the trial had to look into the acceptance of the DvB-H signal as the broadcasting signal. Results were:

- The participants agreed on the visual quality of the broadcast signal (image resolution) was good and better than most participants expected prior to the trial
- Users (five) with 3G mobile TV experience all agreed that the DvB-H based signal offer a much higher quality.

#### 3.3.3 Interactivity perspectives

Within the CAMMP project, there was an assumption that the users would like to interact with content on the device and would like to produce own content. The trial showed that:

- Some participants (total of 9) did like to produce their own videos (content) – however others (total of 6) did not (6)
- The participants (a total of 10) liked to vote on the best content
- The integration of voting as a service was found easier than normal, as the users could vote directly from a video without leaving the video and having to remember a particular number (as many of the same services imply)
- All participants liked to share content and most of the participants already engage in mobile social networks where they share content. However, privacy came up as an important issue, as some content is meant for a limited group of people.

#### 3.3.4 Ideas generated

The above-mentioned tasks had to take place in order to understand some of the possibilities in mobile TV and to motivate creative thinking about needed services. The participants identified the following list of needs/ideas:

- Need for adjusted TV content for the mobile platform
- Need for services such as:

- Games and computer game reviews
- A TV/program guide
- Music channels where the user can select the songs to be played
- Sequences of music videos to watch
- Football – pay per view
- DR's net TV archive so that the user can choose old programs to watch (DR is one of the major broadcast providers in Denmark and an active part of the CAMMP project)
- The option to get more information on the TV clips shown in the news channels
- Synchronic watching with friends
- Broadcasting within small and closed groups which may change (in structure and participants)
- Puzzle questions for entertainment.

## 4. CONCLUSIONS

Overall, the semi-field test shows that the users experience the mobile phone and mobile TV as a social activity. This was seen in the behavior of some of the users and how they liked to share the experience of mobile TV, and that mobile TV could play a central role in the social setting of the user and his friends.

The limited broadcasting coverage was found less problematic than expected. On the contrary, the experience of watching mobile TV and the abrupt stop of this (when leaving the coverage area) generated thoughts on when it would be valuable to watch television.

The results of the semi-field trial, presented in this paper, shows that the participants accepted the concept of mobile TV and that they perceived the DVB-H broadcasted quality to a satisfaction where several of the participants expressed interest in buying it as it was. Additionally, the paper shows that the participants value the social sharing of content to be of high relevance and in particular, when they are using mobile phones as basis for sharing content.

Using the N77 device as a probe was good in relation to the idea generation. The participants did get experience into the mobile TV world and were able to use this as the outset for generation of needs and for new content and services.

This paper presents one part of a bigger trial made in spring 2009. The other part consists of a focused lab-trial studying collaborative and competitive behavior. Details on these trials can be found in Fleury et al., [3]. The CAMMP project will continue until 2012. Future user involved trials will focus on privacy and personalization perspectives for the user as core elements.

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## 6. REFERENCES

- [1] Battarbee, K. 2003, Defining co-experience, Proceedings of the 2003 international
- [2] Fitton, D., Cheverst, K., Rouncefield, M. Dix, A., and Crabtree, A. 2004. Probing technology with technology probes. Presented at the Equator Workshop on Record and Replay Technologies, February 12-13, London: EPSRC.
- [3] Fleury, A., Pedersen, J.S., and Larsen, L.B., 2009, Two perspectives on mobile television: Consumption in a social context and collaborative/competitive behaviors, in Proceedings of the Ninth Danish Human-Computer Interaction symposium, Aarhus University, pp. 18-2.
- [4] Garver, B., Dunne, T., and Pacenti, E. 1999. Cultural probes. *Interactions*, January + February, 1999, pp. 21-29.
- [5] Hulkko, S., Matelmäki, T., Virtanen, K., and Keinonen, T. 2004. Mobile Probes. NordiCHI '04, October 23-27, 2004, Tampere, Finland.
- [6] Hutchinson, H., Mackay, W., Wessterlund, B., Bederson, B.B., Druin, A., Plaisant, C., Beaudouin-Lafon, M., Conversy, S., Evans, H., Hansen, H., Ruessel, N., Eiderbäck, B., Lindquist, S., and Sundblad, Y. 2003. Technology probes: Inspiring design for and with families. CHI 2003, April 5-10, 2003, Ft. Lauderdale, Florida, USA.
- [7] Johnsen, T.E. 2003. The social context of the mobile phone use of Norwegian teens. In Katz, J.E. (Ed.) 2003. *Machines that become us: The social context of communication technology*, pp. 161-170. New Brunswick, NJ: Transaction Publishers.
- [8] Licoppe, C. 2003. Two modes of maintaining interpersonal relations through telephone: From the domestic to the mobile phone. In Katz, J.E. (Ed.) 2003. *Machines that become us: The social context of communication technology*, pp. 171-186. New Brunswick, NJ: Transaction Publishers.
- [9] O'Hara, K., Mitchell, A.S. and Vorbau, A. 2007. Consuming video on mobile devices. CHI 2007 Proceedings, April 28-May 3, 2007, San Jose, CA, USA.
- [10] Sanders, L. 2002. Collective Creativity. In LOOP: The AIGA Journal of Interaction Design. DOI=<http://loop.aiga.org/content.cfm?Alias=Sandersucd>.
- [11] Schatz, R., Wagner, S. Egger, S. and Jordan, N. 2007. Mobile TV becomes social – integrating content with communications. Proceedings of the International Conference on Information Technology Interfaces (ITI'07), Dubrovnik, Croatia, June 2007. IEEE Computer Society, Washington DC.
- [12] Taggar, S. 2002. Individual creativity and group ability to utilize individual creative resources: A multilevel model. *Academy of Management Journal*, Vol. 45, No. 2, pp. 315-330.
- [13] Virpi, O., Noppari, E., Tammela, A., Mäkinen, M. and Ollikainen, V. 2007. Mobile TV in everyday contexts – individual entertainment or shared experiences?. EuroITV, 2007, LNCS 4471, pp. 215-225. Springer Verlag Berlin Heidelberg 2007.